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OAK RIDGE GASEOUS DIFFUSION PLANT

MARTIN MARIETTA

RCRA FACILITY INVESTIGATION PLAN K-1070-F OLD CONTRACTORS BURIAL GROUND OAK RIDGE GASEOUS DIFFUSION PLANT OAK RIDGE, TENNESSEE

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Oak Ridge K-25 Site

OPERATED BY
MARTIN MARIETTA ENERGY SYSTEMS, INC.
FOR THE UNITED STATES
DEPARTMENT OF ENERGY

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DECEMBER 1988 K/HS-146

RCRA FACILITY INVESTIGATION PLAN
K-1070-F OLD CONTRACTORS' BURIAL GROUND
OAK RIDGE GASEOUS DIFFUSION PLANT
OAK RIDGE, TENNESSEE

Prepared by the
Oak Ridge Gaseous Diffusion Plant
Oak Ridge, Tennessee 37831
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MARTIN MARIETTA ENERGY SYSTEMS, INC.
for the
U.S. DEPARTMENT OF ENERGY
under contract DE-AC05-84OR21400

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1. INTRODUCTION

Within the confines of the Oak Ridge Gaseous Diffusion Plant (ORGDP) are hazardous waste treatment, storage, and disposal facilities; some are in operation while others are no longer in use. These solid waste management units (SWMUs) are subject to assessment by the U.S. Environmental Protection Agency (EPA), as required by the 1984 Hazardous and Solid Waste Amendments (HSWA) to the Resource Conservation and Recovery Act (RCRA). The RCRA Facility Investigation (RFI) Plans are scheduled to be submitted for all the SWMUs during calendar years 1987 and 1988. The RFI Plan - General Document (K/HS-132) includes information applicable to all the ORGDP SWMUs and serves as a reference document for the site-specific RFI Plans. Quality control (QC) procedures for remedial actions occurring on the Oak Ridge Reservation (ORR) are presented in The Environmental Surveillance Procedures Quality Control Program, Martin Marietta Energy Systems, Inc., (ESH/SUB/87-21706/1), and quality assurance (QA) guidelines for ORGDP investigations are contained in The K-25 RFI Quality Assurance Plan (K/HS-231).

This document is the site-specific RFI Plan for the K-1070-F Old Contractors' Burial Ground and is based upon requirements described in the draft document, RCRA Facility Investigation Guidance (Vols. I-IV, December 1987). Contained within this document are geographical, historical, operational, geological, and hydrological data specific to the K-1070-F site. The potential for release of contamination through the various media to receptors is addressed. A sampling plan is proposed to further determine the extent (if any) of release of contamination to the surrounding environment. Included are health and safety procedures to be followed when implementing the sampling plan. Procedures for managing and displaying data collected from the RFI are summarized.

RCRA FACILITY INFORMATION

2. OBJECTIVES OF RCRA FACILITY INVESTIGATION PLANNING

2.1 OBJECTIVES

This RFI Plan will identify actions necessary to determine the nature and extent (if any) of releases of hazardous and/or radioactive contamination from the K-1070-F Old Contractors' Burial Ground. The plan summarizes existing site information and addresses the potential for contamination of the soil, groundwater, surface water, and air.

2.2 EVALUATION CRITERIA

In order to prepare and implement a comprehensive sampling plan and to effectively evaluate analytical sampling results, evaluation criteria must first be established. Criteria for evaluating the extent of contaminant releases are based on existing state and federal regulatory guidance and best technical judgment.

The primary media of interest for the K-1070-F Old Contractors' Burial Ground are surface water, groundwater, and soil. Surface water and soil samples will be collected as part of the RFI and analyzed for contaminants according to the methodology described in Section 8. Groundwater will be sampled as a part of the ORGDP Groundwater Protection Program. The sampling methodology and analytical procedures are designed to characterize the contaminants of interest at or below the levels summarized in Table 2.2 of K/HS-132.

2.3 SCHEDULE FOR SPECIFIC RFI ACTIVITIES

A list of the sampling and analysis activities that will be performed for this RFI and the duration of each activity is shown in Table 2.1.

2.1. Duration of RFI activities for
the K-1070-F Old Contractors' Burial Ground

Activities	Duration
1. Site preparation and sample location	
a) spring and seep samples	4 weeks
b) soil samples	4 weeks
2. Collection of samples	
a) grab samples from springs and seeps	4 weeks
b) groundwater samples	52 weeks
c) soil samples	2 weeks
3. Analysis of samples	
a) grab samples	20 weeks
b) groundwater samples*	66 weeks
c) soil samples	8 weeks
4. Compilation of data and data presentation	15 weeks
5. Evaluation of results and recommendations	2 weeks
6. Preparation of RFI report and submittal to EPA	8 weeks
7. Additional sampling phases (if needed)	TBD

*Groundwater sample analysis will occur concurrently with groundwater sample collection.

2.4. FEASIBLE ALTERNATIVES

Knowledge of feasible corrective measures has been used in preparing this RFI plan. Based on existing geologic, hydrologic, and contaminant source data, potential corrective measures for the K-1070-F Old Contractors' Burial Ground have been identified and are shown in Table 2.2. These corrective measures will be reevaluated after the RFI report is completed.

2.5 RISK ASSESSMENT

The environmental and public health risks associated with possible site contamination and the remedial action alternatives listed in Table 2.2 will be evaluated. This evaluation will consist of a characterization of contaminant sources, the environmental setting, the magnitude of release, the pathways to human exposures, and a characterization of risks. The site sampling plan has been designed to provide data necessary for performing risk assessments.

Table 2.2. Potential corrective measures for the K-1070-F Old Contractors' Burial Ground

General Response Action	Technologies
Monitoring	Surveillance monitoring and analysis
Removal of source	Excavate the contaminated soils and material-treat or dispose of at an approved landfill
Containment from groundwater	Subsurface collection drains - french drains, tile drains, pipe drains
	Vertical containment barriers- soil bentonite slurry wall, cement bentonite slurry wall, vibrating beam, grout curtain, steel sheet piling
	Groundwater diversion pumping - well points, deep wells, suction wells, ejector wells
Treatment of Groundwater	Transport collected groundwater to a treatment facility
Containment from surface water	Cap - synthetic membrane, clay, asphalt, multimedia cap, concrete, or chemical sealants and stabilizers

3. DESCRIPTION OF CURRENT CONDITIONS

3.1 GEOGRAPHICAL INFORMATION

The K-1070-F Old Contractors' Burial Ground is located southwest of the main plant (Figure 3.1) and is outside of the security fence. A larger scale location map showing the boundary of the burial ground and a photograph of the burial ground are shown in Figures 3.2 and 3.3, respectively. Complete geographical information is located in Section 3.1 of K/HS-132.

3.2 HISTORICAL INFORMATION

Burial operations began at the K-1070-F site in 1974 and ceased in 1978. Interviews with ORGDP personnel familiar with the operation of the burial ground revealed that the area was used for the disposal of construction debris (i.e., steel, roofing material, clean scrap, asbestos, Transite (building siding), skids, pallets, cross-ties, rebar in concrete, brick, metal wire, concrete, and asphalt). Rock debris and dirt from pit and water line excavations were also disposed of at the K-1070-F site. Some uncontaminated roofing materials were disposed of at the K-1070-F site during the 1973-1974 reroofing program at ORGDP; however, all contaminated roofing material was disposed of at the Y-12 Plant. The area was restricted to the disposal of nonhazardous materials; no contaminated materials or hazardous chemicals were allowed.

In 1982, spoil dirt from the construction of the K-1066-K cylinder storage yard was hauled to the K-1070-F site to landscape the area and to allow personnel to sow grass and plant trees. Because disposal records were not kept during the first three years of operation, the Tennessee Department of Health and Environment (TDHE) suggested that further investigation at the K-1070-F site was warranted. No violations have been issued for this site, and it is not presently listed as a CERCLA or RCRA

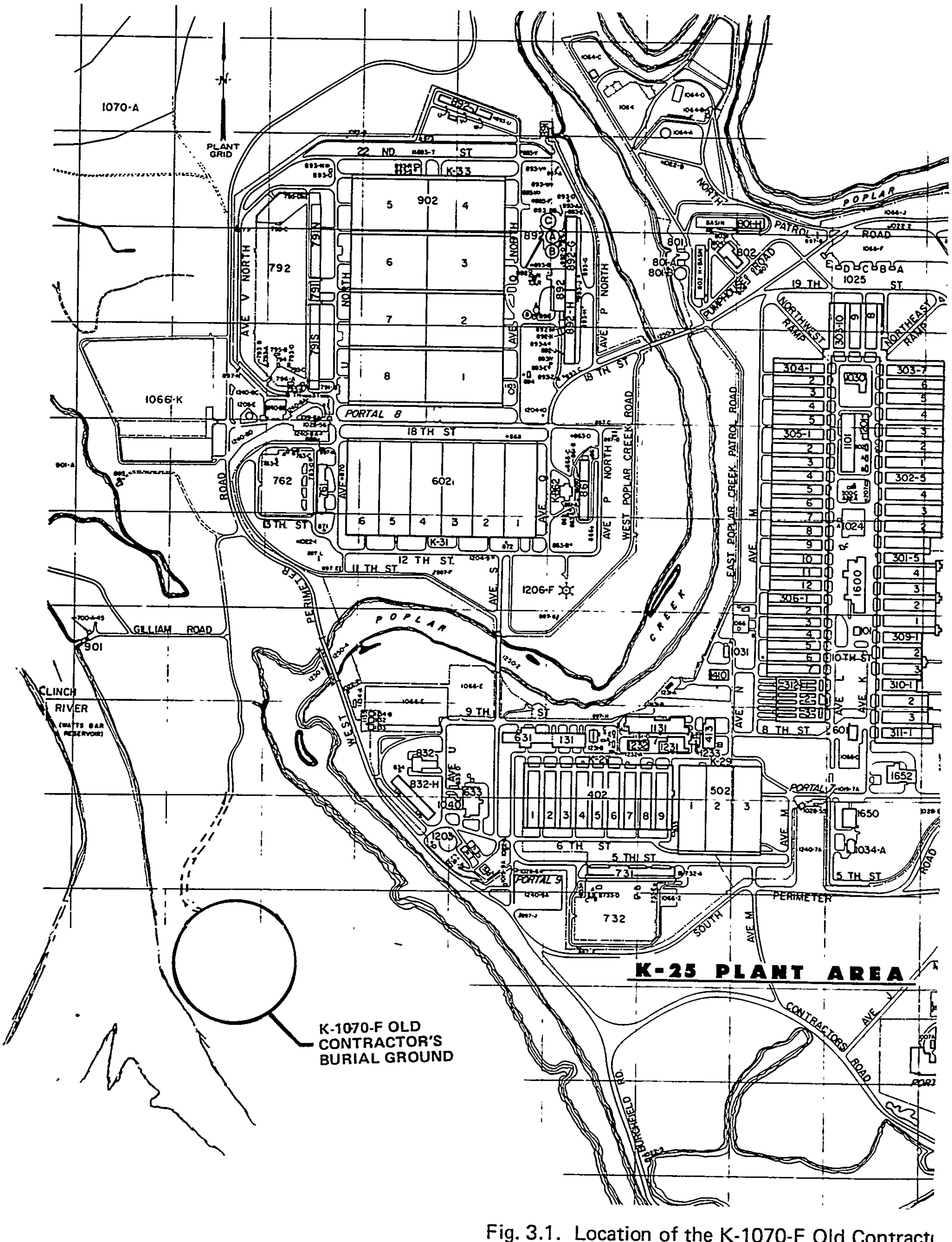
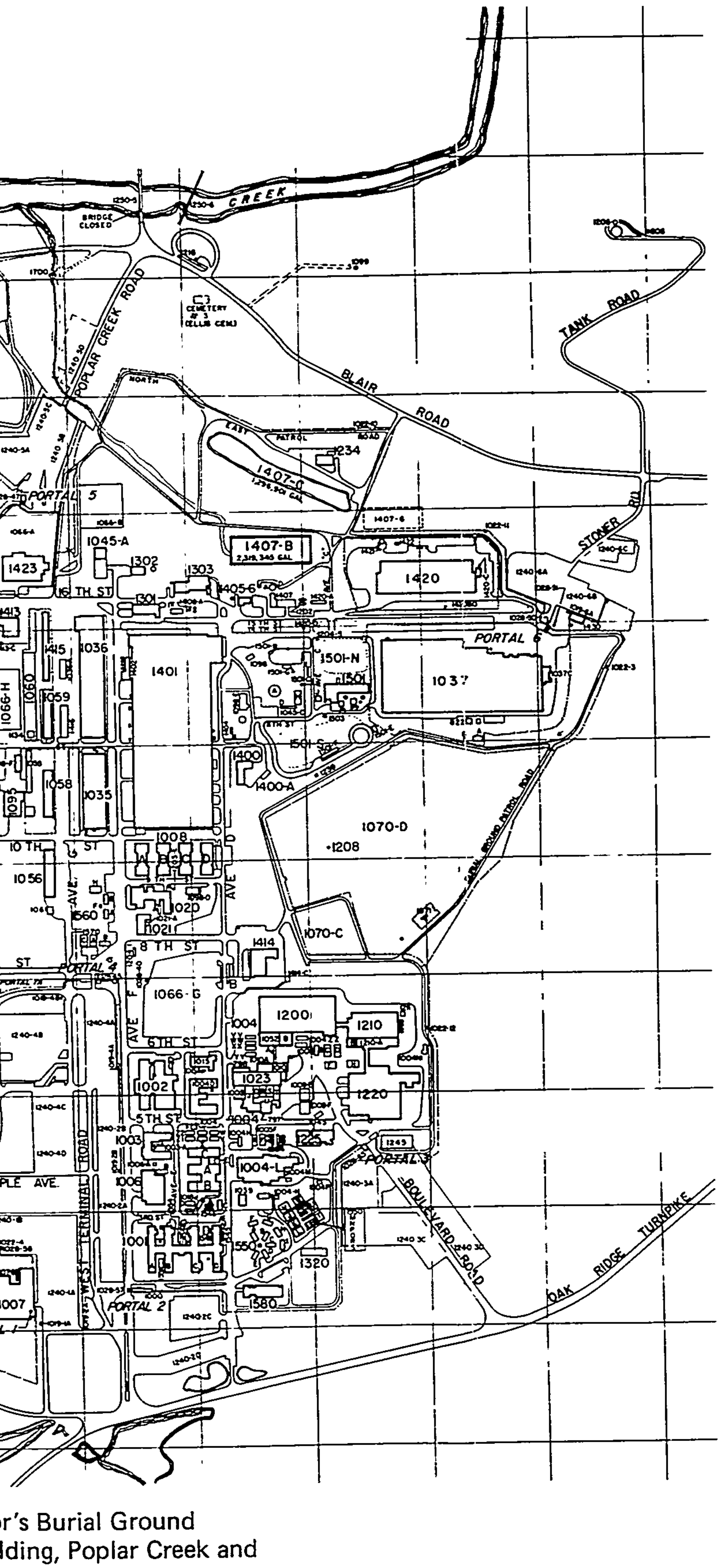


Fig. 3.1. Location of the K-1070-F Old Contract
(The final figure will show the locations of the K-25 bu
the Clinch River.)



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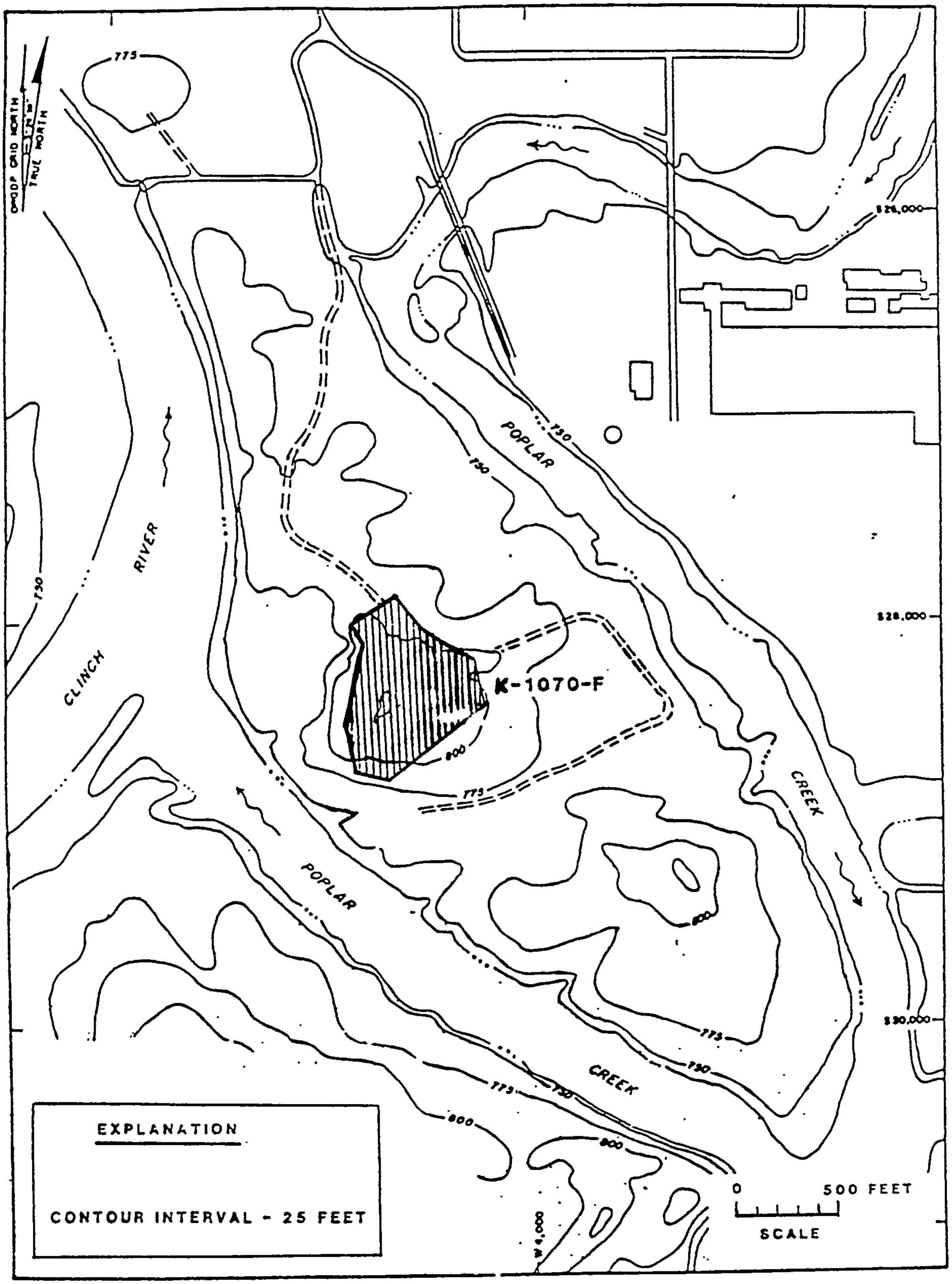

Fig. 3.2. K-1070 Old Contractor's Burial Ground Location Map

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Fig. 3.3. K-1070-F Old Contractors Burial Ground

site. The K-900 bottle smasher which is located within the K-1070-F boundary has a RCRA Part B permit application which is under review by the TDHE and the EPA. This thermal treatment unit was installed after burial operations at the K-1070-F site had ceased and is used for the destruction of organic chemicals.

In 1984, a geotechnical investigation was conducted in the K-1070-F area to determine the feasibility of constructing a Toroidal Fusion Core Facility on the site. Approximately 51 soil borings were made in the area on a 150 foot grid. Data obtained from each boring included fill thickness, depth to the water table, depth to refusal, elevation, and soil description. Information from this investigation is presented in Appendix A and is discussed in Section 5. A closure plan has been written for the K-1070-F site, but it has not been submitted. Complete historical information on the ORGDP is located in Section 3.2 of K/HS-132.

3.3 OPERATIONAL INFORMATION

Interviews with ORGDP personnel familiar with the operation of the K-1070-F burial ground revealed that the burial operation utilized a natural ravine for disposal of construction and excavation debris. Debris was dumped on the surface of the ravine and eventually covered with dirt.

Record-keeping of the quantities and types of materials disposed of in the K-1070-F burial ground began in 1977. Controls established in 1977 require detailed documentation of waste materials presently disposed of at ORGDP. Records must identify the requestor, the source of the waste material, description of the waste, its hazardous nature (if applicable), and the place and method of disposal. Documentation of materials disposed of in the K-1070-F burial ground after the establishment of these controls is presented in Section 4.

The K-900 bottle smasher remains in use for the disposal of bottles of organic materials. The bottle smasher consists of a 3' x 5' x 2' high steel box with a lid which can be lowered to crush the bottles. The released organics are then ignited by use of a heating element. The operation is controlled from a bunker approximately 150 feet east of the steel box.

4. CHARACTERIZATION OF THE CONTAMINANT SOURCE

Prior to 1977, records of materials disposed of in the K-1070-F burial ground were not kept. Assessment of the nature and amount of waste materials disposed of from 1974 to 1978 is based on interviews with ORGDP personnel; the materials are discussed in Section 3 and are summarized below.

- steel
- clean scrap
- asbestos
- concrete
- skids
- asphalt
- brick
- Transite (building siding)
- dirt and rock debris
- roofing material
- rebar in concrete
- metal wire
- cross-ties
- pallets

Records of requests for waste disposal at the K-1070-F burial ground since 1977 are listed in Table 4.1.

The K-900 bottle smasher is used for the disposal of bottles of organic materials. Leakage of the organic materials before combustion or the possibility of incomplete combustion provides the potential for shallow soil contamination in the vicinity of the bottle smasher. Elevated levels of PAH were found in a 1986 study of soil samples surrounding the bottle smasher. Data from analysis of these samples are presented in Appendix C and are discussed in Section 7.

Table 4.1. Disposal records for the K-1070-F Old Contractors' Burial Ground

Date	Source	Material Description
10-24-77	K-892 and K-862 Cooling Towers	58 fanstacks
04-10-78	"	200 ft^3 of glass mixed with paper
05-08-78	"	2 cabinets 28 wood pallets
08-01-78	"	Fullers earth (filter compound)

5. CHARACTERIZATION OF THE ENVIRONMENTAL SETTING

The K-1070-F Old Contractors' Burial Ground is located southwest of the main ORGDP area within an elongated meander of Poplar Creek. The burial ground is situated approximately 60 feet above the creek near the creek's confluence with the Clinch River.

Five bedrock monitoring wells have been installed in and around the burial ground (Figure 5.1). BRW-21, 22, 23, and 24 were completed in December 1986 (Phase II-Detection Monitoring, ORGDP, Geraghty and Miller, June 1987), and lithologic logs of these wells are included in Appendix B. BRW-40 was installed recently and will serve as a background well; no data are presently available from this well. In 1984, the K-1070-F area was the focus of a geotechnical investigation for a proposed Toroidal Fusion Core Facility (TFCX) (Geotechnical Investigation for the Toroidal Fusion Core Facility, K-25 Plant at Oak Ridge, Tennessee, Geotek Project No. 83-1370). The investigation included borings at 45 locations, 5 of which utilized a diamond core drill to penetrate the bedrock. The locations and brief summaries of the TFCX borings in the K-1070-F area are presented in Appendix A.

The general geology of the ORGDP area is shown in Figure 5.2 of K/HS-132 and has been compiled from three major sources: (1) Hydrogeology of the Oak Ridge Gaseous Diffusion Plant Site, Geraghty and Miller, 1986, (2) recent, unpublished work by R.H. Ketelle, Oak Ridge National Laboratory, and (3) "Geologic Map of the Oak Ridge Area, Tennessee," by W. M. McMaster, U. S. Geological Survey, 1958. The following geologic descriptions and discussions of hydrogeology are based on these sources, and specific data, permeabilities, etc., are referenced as applicable.

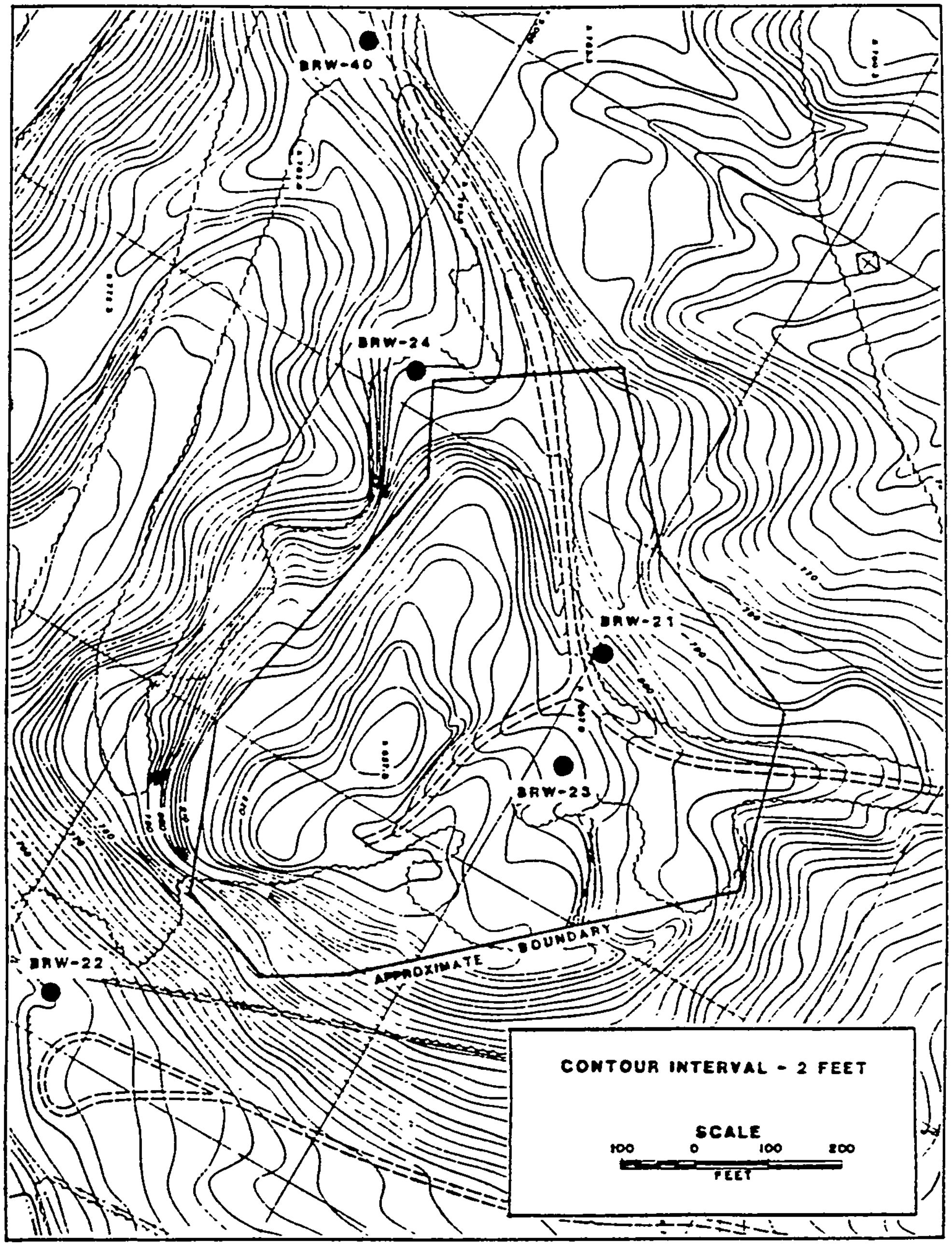


Fig. 5.1. K-1070-F Topography and Monitoring Well Locations

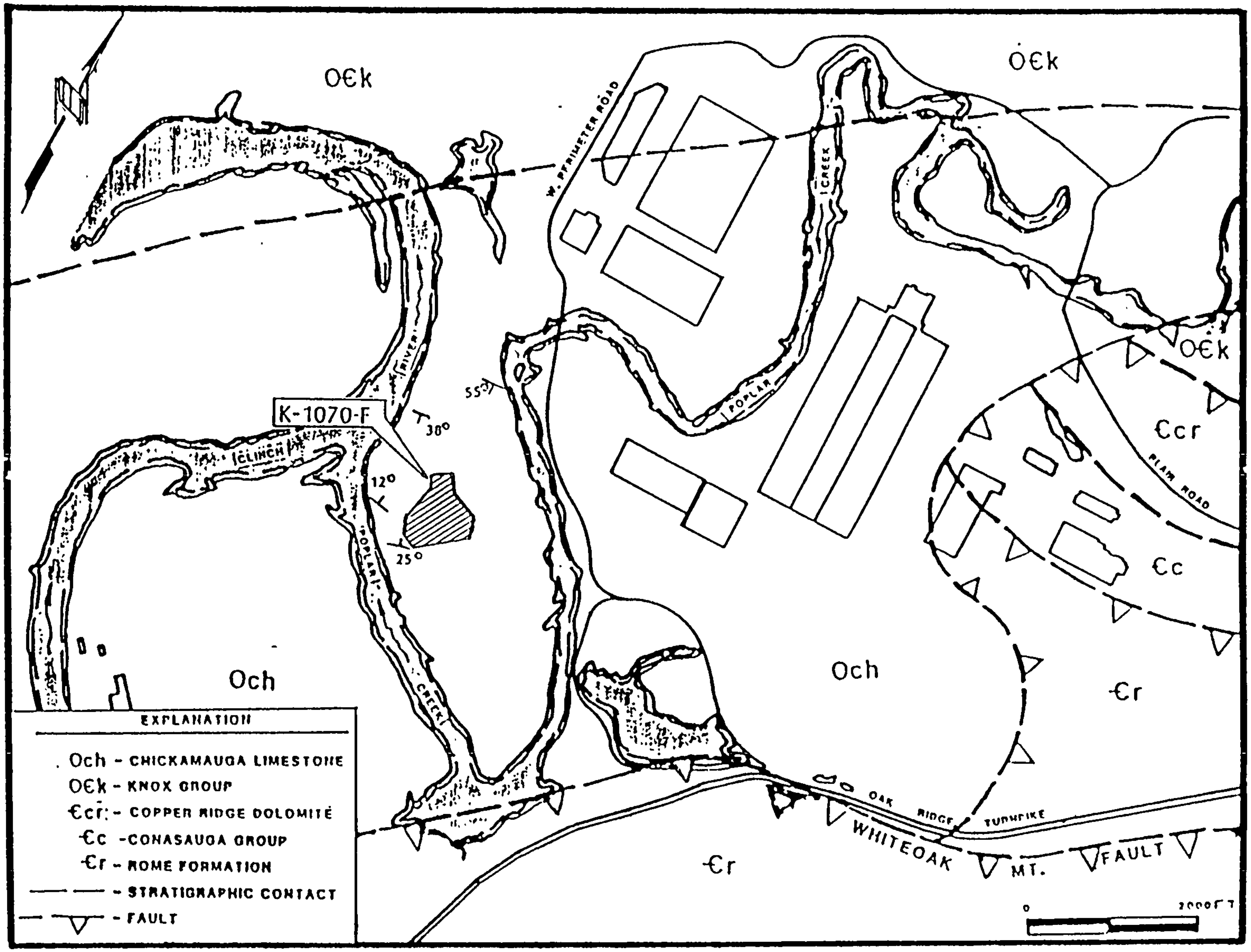


Fig. 5.2. Geologic Map of the ORGDP Area. Adapted from: *Hydrogeology of the Oak Ridge Gaseous Diffusion Plant Site,* Geraghty & Miller (1986); and an unpublished map by R. H. Ketelle, ORNL.

5.1 HYDROGEOLOGY

The K-1070-F area is underlain by the Chickamauga limestone which is comprised of gray, fine-grained limestone and dark gray, calcareous shale. The TFCX logs indicate that much of the limestone is fossiliferous. Secondary calcite (Geraghty and Miller logs, Appendix B) and calcite-filled fractures (TFCX logs) are indicative of intense bedrock fracturing associated with faulting. The Whiteoak Mountain thrust fault trends to the northeast approximately 2,000 feet southeast of the K-1070-F site (Figure 5.2). In association with the Whiteoak Mountain thrust, the bedrock strata in the area have been affected by various degrees of deformation, fracturing, and secondary faulting. Outcrop measurements indicate an east-west strike with shallow northward dips of 12 to 25 degrees (Figure 5.2). TFCX logs show dips of 10 to 15 degrees to the north. Just north of K-1070-F, the beds dip somewhat steeply to the south so that a synclinal structure is implied.

Groundwater flow in the Chickamauga limestone occurs mainly through a system of solution-enlarged joints, fractures, and bedding planes. At present, permeability data are not available for the bedrock beneath K-1070-F; however, tests on wells in the Chickamauga formation in nearby areas indicate the average hydraulic conductivity of the formation is approximately 3.5×10^{-3} cm/sec. This value is presumed to be representative of the bedrock aquifer beneath the K-1070-F burial ground. The direction of groundwater flow in the bedrock aquifer is believed to be both eastward and westward toward Poplar Creek.

The unconsolidated zone, except for the disturbed areas used for waste disposal, consists of red or orange-brown to brown, silty clay with scattered chert fragments, a residual soil derived from weathering of the Chickamauga limestone. The thickness of the unconsolidated zone varies from

15 to 65 feet but averages 30 feet over most of the site. No site-specific permeability data are available for the unconsolidated zone. However, tests conducted on similar soils in a nearby area (K-770, K/HS-137) indicate an average hydraulic conductivity of 10-5 cm/sec, which should be representative of the soils within the K-1070-F area.

The topographic setting of K-1070-F suggests that groundwater in the unconsolidated zone would also probably flow both eastward and westward toward Poplar Creek, although it is also probable that this zone "leaks" to some extent into the bedrock aquifer. Presently, no groundwater data specific to the unconsolidated zone are available for this site.

The disturbed areas in the unconsolidated zone may contribute to increased infiltration and mounding of groundwater beneath the K-1070-F site. Also, the burial ground may be acting as a leaky impoundment, temporarily holding water according to the porosity and storage capacity of the buried waste. The TFCX borings indicate that the fill depth varies from zero to 23.5 feet below the existing land surface. These borings also confirm that the thickness of the undisturbed clay buffer beneath the fill varies from as little as 7 feet to over 40 feet. The average thickness of the buffer zone is 26 feet.

Groundwater recharge over the K-1070-F area is by infiltration through the unconsolidated zone. No outcrops, sinks, or other natural features which would enhance infiltration were observed on this site.

5.2 SURFACE WATER

While there are ephemeral springs at the site, there are no perennial streams or springs within the K-1070-F area. The sites of the ephemeral springs are not shown because the locations of the springs may change seasonally. Precipitation is subject to both infiltration and runoff, the latter collecting in natural drainways and eventually flowing with the topography into Poplar Creek (see Figure 3.2). There are no storm drains or other man-made structures to channel or impede surface water flow. The K-1070-F facility is above the 100-year flood level as indicated in Figure 3.5 of K/HS-132.

5.3 AIR

No site-specific air quality data are available for this SWMU. However, Martin Marietta Energy Systems, Inc., has an ongoing study of the air quality and meteorological conditions for the entire ORGDP, and this study should be representative of the conditions at the K-1070-F site. The general ORGDP data are available in Section 4.4 of K/HS-132.

6. IDENTIFICATION OF POTENTIAL PATHWAYS AND RECEPTORS

Assessments of inactive hazardous waste disposal or storage sites are required to evaluate the sites' potential for health or safety risks to the environment, public, and personnel. Determination of such risks must be based on evaluations of both the potential pathways of contaminant migration from toxic releases and the possible receptors of the contamination. Information used in the evaluations of the pathways which might release contaminants from the K-1070-F Old Contractors' Burial Ground is based on records of quantities and types of materials buried at the site, data obtained from a geotechnical investigation of the site (Geotechnical Investigation for the Toroidal Fusion Core Facility, K-25 Plant at Oak Ridge, Tennessee, Geotek Project No. 83-1370), and interviews with persons having knowledge of the materials disposed of at the site. Section 5 of K/HS-132 will serve as a general reference concerning the potential pathways and receptors at ORGDP.

The operational history of the K-1070-F Old Contractors' Burial Ground and the K-900 bottle smasher presents the possibility of groundwater, soil, and surface water contamination; a Phase I investigation of these media is proposed to assess the extent (if any) of contamination. Should Phase I groundwater or surface water analyses reveal unacceptable contamination levels as a result of the burial ground waste, it is proposed that the Phase II investigation utilize an applicable geophysical technique (e.g., ground-penetrating radar) to determine the boundaries of the buried waste. A statistical set-up for soil sampling will then be proposed. If analyses of soil samples near the bottle smasher indicate unacceptable levels of polycyclic aromatic hydrocarbons (PAH) in the subsurface then in Phase II further study of the area will be conducted. Because of the nature of the materials disposed of in the burial ground and the method of disposal, atmospheric transport is not considered a pathway of contaminant migration.

6.1 POTENTIAL PATHWAYS OF MIGRATION

6.1.1 Groundwater

Four groundwater monitoring wells and one background well have been installed around the K-1070-F site. One quarter of data has been obtained from the monitoring wells and these data are presented in Appendix D. A discussion of the groundwater data can be found in Section 7. At present, no data are available from the background well.

The hydraulic conductivities of the bedrock and the unconsolidated zone, coupled with the possibility of solution-enlarged joints and fractures in the bedrock, could provide rapid transport of contamination. The potential for rapid groundwater movement is increased in fill areas due to the higher porosity of the fill material.

Several ephemeral springs located around the burial ground could provide rapid transport of soil and/or surface water contamination from infiltration and interflow during and following storm events. Assessment of the nature and extent of possible groundwater contamination will be carried out under the ORGDP Groundwater Protection Program.

6.1.2 Surface Water

There are no perennial streams or springs within the boundary of the K-1070-F burial ground. Surface water which collects during and after storm events flows eastward or westward to Poplar Creek. A portion of the precipitation which infiltrates the unconsolidated zone is discharged via springs and seeps which have been observed in the area. Grab samples will be collected from these springs and seeps after two discrete storm events and will be analyzed to assess the extent (if any) of surface water contamination.

6.1.3 Soil

The K-900 bottle smasher is used for the disposal of bottles of organic materials. Previous analysis of the soil near the bottle smasher revealed a slight elevation in concentration of PAH. The elevated levels of PAH were found on the west and northwest sides of the unit near the bottle smasher drain. The extent of the soil contamination will be assessed by analysis of soil samples taken with a hand auger from the area surrounding the K-900 bottle smasher.

6.2 POTENTIAL RECEPTORS

6.2.1 Human Populations

Of the 25 potable water wells within one mile of ORGDP, none of the wells are in proximity to the burial ground, and none are believed to occupy the same hydrogeological environment as the groundwater at the site (see Sections 4.2 and 4.3 of K/HS-132). Further, of the 10 public water supplies which withdraw from the Clinch-Tennessee River system (into which Poplar Creek drains), none of these are nearer than eight miles to the ORR. While direct discharge of surface runoff and site groundwater presents the potential for contamination, distance and dilution effects make pollution of public water supplies of low probability. Finally, the effects of distance and dilution also make unlikely the possibility that contamination of surface water and groundwater would reach the waters used downstream in the Clinch-Tennessee River system for recreational and industrial use. The risk to human populations will be assessed after the data are collected and analyzed.

6.2.2 Fauna and Flora

Section 5.3 of K/HS-132 discusses the rare, threatened, and endangered plant and animal species which are thought to inhabit the area. To date, there has been no report that any of these species exist on the K-1070-F site or that endangered species in the area surrounding the K-1070-F site are directly threatened by any possible contamination present there. The risk of contamination released from the site to the local flora and fauna will be assessed subsequent to the RFI.

6.3 SUMMARY AND CONCLUSIONS

The nature of the materials disposed of at the K-1070-F Old Contractors' Burial Ground, the lack of documentation during the first two years of burial operations, and the site hydrogeology indicate the potential for groundwater and surface water contamination. Also, elevated levels of PAHs in the soil surrounding the K-900 bottle smasher warrant additional soil sampling in the area. Evaluation of the pathways of contaminant migration and possible receptors shows sufficient potential of environmental contamination and warrants an investigation of the site.

7. EXISTING MONITORING DATA

The wells installed as part of the ORGDP Groundwater Protection Program are in compliance with the requirements found in RCRA Groundwater Monitoring and Technical Enforcement Document, EPA/OSWER-9950.1. The first quarter of data from the wells is complete and the data are included in Appendix D. Comparison of the data with the maximum contamination levels (MCL) in drinking water indicate no unacceptable levels of groundwater contamination at this site.

In 1986, shallow soil samples were collected to evaluate the extent of contamination from the K-900 bottle smasher. This unit is operated within the confines of the K-1070-F Old Contractors' Burial Ground under a RCRA Part B permit application. The sampling plan and resultant data collected for that evaluation are included in this report in Appendix C. The data show only a slight contamination by PAH near the bottle smasher drain. At concentrations of 115 to 150 mg/kg total PAHs, the level was only slightly above the suggested guidelines of 100 mg/kg as shown in Table 2.2 of K/HS-132. The data also show that the PAH are localized on one side of the unit only. Additional soil samples will be taken near the bottle smasher to further determine the extent of contamination present in the soil. Groundwater analyses do not reveal PAH contamination at this time; continued monitoring of groundwater will determine if unacceptable levels of subsurface contamination exist.

8. SAMPLING PLAN

8.1 SAMPLING AND ANALYTICAL STRATEGY

Preparation of the sampling plan for this site is based upon records of materials disposed of at the burial ground, initial data from the ORGDP Groundwater Protection Program, and analytical data from samples collected to characterize the K-900 bottle smasher. Burial records for the site indicate no hazardous materials were disposed of at the site; however, records do not exist for the early operational history of the burial ground. The analytical data from the first quarter of groundwater monitoring show no unacceptable levels of groundwater contamination from the site. An investigation of the K-900 bottle smasher was completed in 1986, and analytical data indicate that the only contamination from its operation is a slight elevation of PAH in the upper six inches of soil on the west and northwest sides of the unit. The absence of elevated levels of PAH in downgradient samples indicates that contamination is localized around the drain of the unit. The surface soil samples proposed in this RFI from the bottle smasher area will be analyzed for semivolatile organic compounds and will serve to identify the extent of contamination from this unit. If analyses of these samples indicate unacceptable levels of PAH at greater depths, then in Phase II further study of the bottle smasher area will be conducted.

Observations made at the site indicate that there are springs and seeps which drain from the K-1070-F area. Because infiltration into the unconsolidated zone is augmented by the higher permeability of the fill material, any water contaminated from contact with the waste is likely to be found in these springs and seeps. Analysis of grab samples from these springs and seeps will serve to identify any contamination leached from the site. If analyses of these samples indicate unacceptable levels of contamination, then in Phase II a geophysical survey will be conducted to determine the boundaries of the burial ground. A statistical set-up for soil sampling will then be proposed to determine the contaminant source. Data from the monitoring wells installed as part of the ORGDP Groundwater Protection Program will be utilized as part of the characterization of this site.

8.2 STATISTICAL SET-UP FOR SAMPLING

The bottle smasher soil will be sampled at the five locations shown in Figure 8.1. At each of the five sampling locations, three discrete samples at depths of one, two, and three feet will be taken. The sampling order is given in Table 8.1.

8.3 FIELD SAMPLING

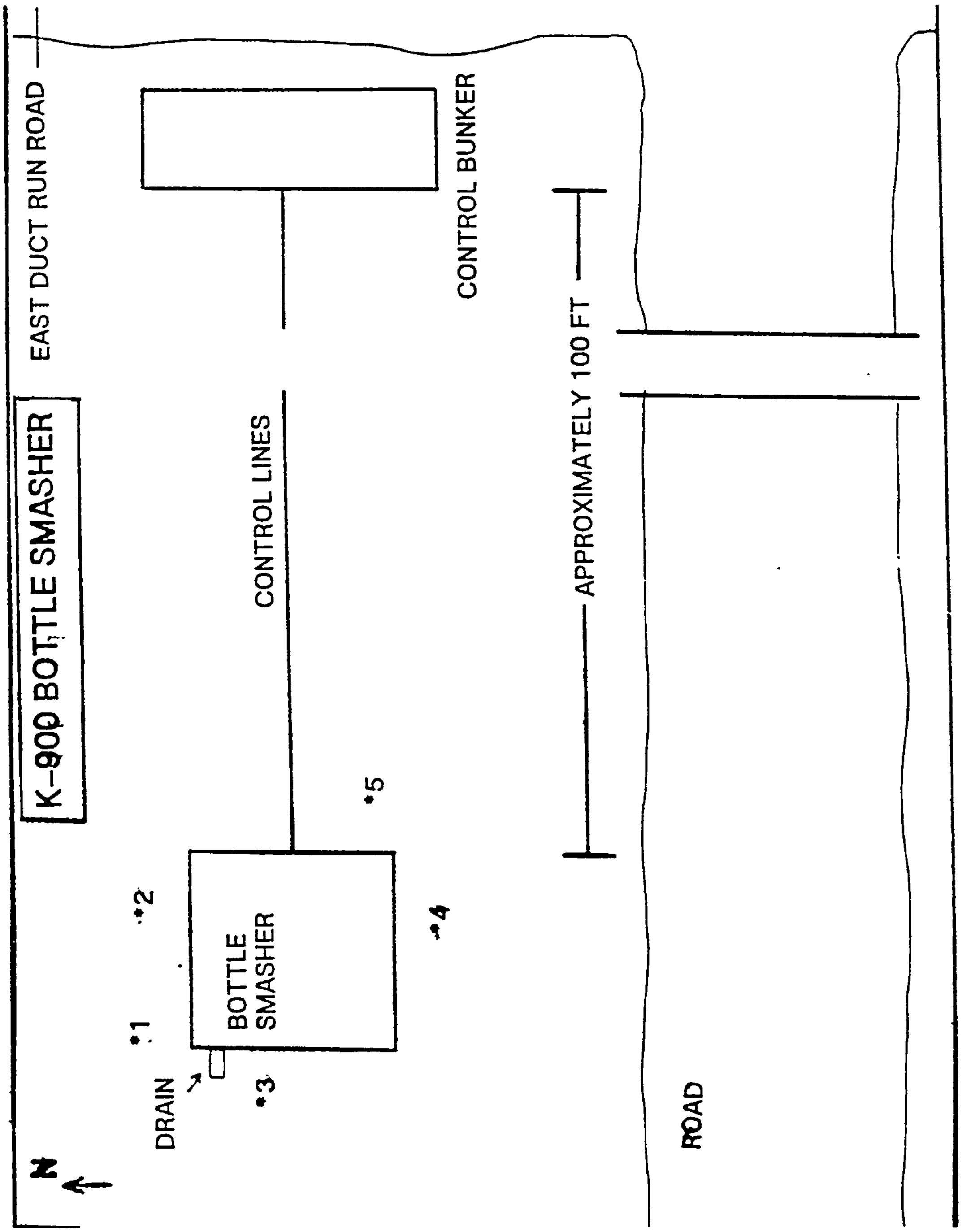
All field sampling procedures discussed in Section 8.2 are more fully described and documented in The Environmental Surveillance Procedures Quality Control Program, Martin Marietta Energy Systems, Inc., (ESH/SUB/87-21706/1).

8.3.1 Site Preparation

In order to accurately determine the sampling locations within the K-1070-F area, arrangements will be made through Martin Marietta Energy Systems Engineering to have the site surveyed. Prior to any sampling of the area, the springs and seeps which flow from the area will be located.

Table 8.1. Randomized Sampling Order of Sampling Locations

Sampling Order
3
2
1
4
5



*Sampling locations (one foot from unit)

Figure 8.1. Location of the K-900 Bottle Smasher soil samples

The soil sampling points will be located as shown in Figure 8.1, and markers will be installed. A detailed map of the area will be drawn with the positions of the springs, seeps, and soil sampling points accurately marked. Sampling of the springs and seeps will occur after rainfall has provided an adequate quantity of water for sampling. The exact location of the samples will be determined at the time of sampling. The sampling personnel will mark the locations with stakes and indicate the coordinates on the map of the area.

8.3.2 Equipment and Supplies

The following field sampling supplies will be required:

- Bound logbook
- Chain-of-custody seals
- Sample labels
- Chain-of-custody forms
- Glass containers, precleaned with Teflon-lined lids, one quart capacity
- Dipper
- Non-ionic detergent, Micro (International Products Corporation)
- Deionized water
- Isopropyl alcohol
- Hand auger
- Stainless steel spatulas

8.3.3 Water Sampling Procedure

Collection of water samples from this site will follow EPA 600/4-84-076 Method III-1 which describes the use of a dipper for surface water sampling. Samples will be collected following two discrete storm events. Duplicate grab samples will be collected and transferred to appropriate containers. Between samples, the dipper will be cleaned with nonionic detergent and water and rinsed with deionized water and isopropyl alcohol. A background sample will be collected in a rainfall collector placed at the site.

Sample containers will be labelled with the site identification, date, time, sample identification number, and the sampler's name. The date, site identification, sampler's name, and coordinates of the sample will be recorded in the logbook. In addition to the required entries, any other pertinent information and/or observations will be recorded in the logbook. The logbook used for these records will contain a map of the area and a copy of the sampling plan. The sample containers will be sealed and transported to the laboratory under chain-of-custody protocol as referenced in Section 7.4 of K/HS-132.

8.3.4 Soil Sampling Procedure

Collection of the soil samples from the bottle smasher area will follow EPA 600/4-84-076 Method II-2 for the collection of samples using a hand auger. Samples will be collected to a depth of 12, 24, and 36 inches. Between samples, the equipment used for sampling will be cleaned with nonionic detergent and water and rinsed with deionized water and isopropyl alcohol. All rinsates should be collected and disposed of properly. As the soil is removed from the auger, the soil sample will be transferred to a precleaned one-quart jar (sample should fill the jar).

Each sample container will be labeled with the site identification, date, time, sample identification, sampler's name, and the coordinates of the sample will be recorded in the logbook. In addition to the required entries, any other pertinent information and/or observations will be recorded. The logbook used for these records will contain a map of the area and a copy of the sampling plan.

8.4 ANALYTICAL PROTOCOL

Analytical sampling with the following salient features is proposed. Water samples will be collected from the seeps and springs. Since disposal records are not available for the early years of operation of the site, both organic and inorganic contamination must be considered. All water samples will be analyzed for the inorganic elements outlined in Table 7.4 of K/HS-132 and for gross alpha, beta, and gamma. In addition, all water and soil samples will be analyzed for the semivolatile organic compounds listed in Table 7.6 of K/HS-132.

8.5 SAMPLE ANALYSIS

After reception by the analytical laboratory, samples will be scheduled for the analyses discussed in Section 8.3 of this document. Water sample analyses will follow standard EPA protocol as outlined in Methods for Chemical Analysis of Water and Wastes (EPA-600/4-79-020) and soil sample analysis will follow the protocol outlined in Section 7.2.4 of K/HS-132. The QA/QC requirements outlined in Section 7.3 of K/HS-132 will be adhered to for all analyses.

9. DATA MANAGEMENT PROCEDURES

In order to best illustrate any patterns in the data, the results of the chemical analyses of samples from the potential release areas will be presented in a clear and logical format. Tables, graphs, and other visual displays such as maps and contour plots, described in Table 8.1 of K/HS-132, will be used to present the data.

Statistical analyses will provide for treatment of duplicate laboratory analyses, results which are reported as less than detection limit, and for examination for statistical outliers. Specifically, values which are recorded as less than detection limits will be handled according to the RCRA Groundwater Monitoring Enforcement Guidance Document (OSWER-9950.1, September 1986) which directs calculation through the use of Cohen's statistical methodology. This is found in "Tables for Maximum Likelihood Estimates from Single Truncated and Singly Censored Samples," (Technometrics, Vol. 3: 535-541, 1961).

10. HEALTH AND SAFETY PROCEDURES

10.1 INTRODUCTION

Special requirements and procedures to protect the health and safety of the investigating team, ORGDP site personnel, and the general public during the K-1070-F Old Contractors' Burial Ground RFI are addressed in this section.

Section 9 of K/HS-132 details the health, safety, environmental, security, plant protection, and emergency response organizations which are in place at ORGDP. These organizations provide the support to ORGDP line organizations to meet the requirements for health and safety during the RFIs. They provide the communications, response, and reporting for any plant emergency; on-site medical facilities with medical surveillance, treatment, monitoring, and periodic physical examinations; health physics and industrial hygiene surveillance hazard evaluation and control; operational safety accident prevention and control; plant security and visitor control.

In addition, Section 9 of K/HS-132 identifies the organizational responsibilities for health and safety at the SWMUs during the RFIs. The document also includes the methodology for establishing the work zones of each SWMU, the level of protection required in the exclusion zone, decontamination procedures, personnel exposure limits, monitoring requirements, and respiratory protection requirements.

10.2 KNOWN HAZARDS AND RISKS

Substances of safety and health concern in the K-1070-F Old Contractors' Burial Ground are tabulated below.

Substances of Safety and Health Concern

Substance		Substance	
Waste Solvents and Degreasing Agents		Sludge	
Radioactive Wastes	X	Corrosive Liquids	
Treated Industrial Waste		Plating Wastes	
Liquid Waste/Free Product Potential		Metal Wastes	
Asbestos	X	Cleaning Solutions	
PCB		Paint Wastes	
Mercury		Nonhazardous Wastes	X
		Miscellaneous Volatile Organics Soluble Organics	X

10.3 LEVEL OF PROTECTION

The level of personnel protection and monitoring is designated below for surface water, and groundwater, and soil sampling.

Level of designation	Monitoring Parameters	
A	Airborne Pollutants	X
B		
C X (soil sampling)	Explosion Potential	
D X (water sampling)	Radiation	X

10.4 DESIGNATION OF WORK AREA ZONES

Groundwater, surface water, soil sampling, and analysis will be conducted during Phase I of the K-1070-F RFI. The three zones (Exclusion, Contamination Reduction, and Support) will be established for the soil sampling work activity area in accordance with the methodology developed in Section 9 of K/HS-132. The safety equipment required for the designated level of protection and the decontamination procedures are also covered in K/HS-132.

10.5 EXPOSURE LIMITS

The personnel protection recommended for work activity in the exclusion zone of this SWMU is Level D for water samples and Level C for soil samples due to the potential asbestos contamination of the soil. The Site Health and Safety Officer (SHSO) will have the primary responsibility for monitoring and limiting employee exposure to pollutants. In addition to being trained in accordance with OSHA Standard 1910.120, the SHSO shall be certified "competent" by an EPA/OSHA asbestos abatement training course.

Employee exposure to airborne pollutants throughout the course of the investigation will be monitored through the use of air monitoring equipment (see K/HS-132, Section 9.4). If pollutants or unusual odors are detected work will be stopped, the area will be evacuated, and the ORGDP Industrial Hygiene Department will be contacted to determine necessary actions to mitigate health and safety concerns. Asbestos monitoring will also be performed in the asbestos-contaminated area with a real-time, fibrous aerosol monitor (FAM) and daily use of filter cassettes.

The responsibility for limiting the exposure of the workers to nonhazardous levels of radiation resides in the SHSO using instruments described in Section 9 of K/HS-132. The SHSO will monitor for radiation in the air and adjacent to sample diggings with a radiation meter capable of measuring 0.1 mR/hr. Should the reading exceed 2 mR/hr, the SHSO will request the presence of a health physicist on site who will assess the potential hazard of the conditions. Personnel dosimetry will be required for all site personnel.

Equipment used for sampling, personnel safety shoes, and other protective equipment could be contaminated with radioactive material. Surveys shall be performed on such equipment in the sampling areas before and after each operation. Each survey shall include monitoring all applicable personnel and equipment. Equipment found to be contaminated above the guidelines for unrestricted release (alpha-5000 dpm/100 cm2 surface; 1000 dpm/100 cm2 transferrable, and 0.1 mR/hr beta and gamma) shall be decontaminated.

11. REFERENCES

Cohen, "Tables for Maximum Likelihood Estimates from Single Censored Samples," Technometrics, Vol. 3: 535-541, (1961)

EPA (Environmental Protection Agency), Characterization of Hazardous Waste Site - A Methods Manual: Volume II - Available Sampling Methods, 2nd Edition, EPA/600/4-84-076, December 1984

EPA (Environmental Protection Agency), Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, February 1984

EPA (Environmental Protection Agency), RCRA Facility Investigation Guidance, EPA 530/SW-87-001, Vols. I-IV, OSWER Directive 9502.00-6C, December 1987

EPA (Environmental Protection Agency), RCRA Ground Water Monitoring and Technical Enforcement Guidance Document, OSWER Directive 9950.1, September 1986

Geotek, Geotechnical Investigation for the Toroidal Fusion Cord Facility, K-25 Plant at Oak Ridge, Tennessee, Geotek Project No. 83-1370, June 30,1984

Geraghty and Miller, Hydrogeology of the Oak Ridge Gaseous Diffusion Plant Site, 1986.

Geraghty and Miller, Phase II-Detection Monitoring Oak Ridge Gaseous Diffusion Plant, June 1987.

R. H. Ketelle, Oak Ridge National Laboratory, unpublished geologic map, 86/9769

Martin Marietta Energy Systems, Inc., The Environmental Surveillance Procedures Quality Control Program, ESH/SUB/87-21706/1, September 1, 1988; prepared by Advanced Sciences Corporation.

W. M. McMaster, Geological Map of the Oak Ridge Area, Tennessee, U.S. Geological Survey, 1958.

Oak Ridge Gaseous Diffusion Plant, The K-25 RFI Quality Assurance Plan, K/HS-231, December 1988

Oak Ridge Gaseous Diffusion Plant, RCRA Facility Investigation Plan, K-770 Scrap Metal Yard and Contaminated Debris, Oak Ridge Gaseous Diffusion Plant, Oak Ridge, Tennessee, K/HS-137, June 1988

Oak Ridge Gaseous Diffusion Plant, RCRA Facility Investigation Plan, General Document, Oak Ridge Gaseous Diffusion Plant, Oak Ridge, Tennessee, K/HS-132, March 1987